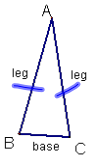
4.7 Use Isosceles and Equilateral Triangles

ΔABC is isosceles

$\overline{AB} \cong \overline{AC}$




∠A is the vertex angle
∠B and ∠C are the base angles

B.A.T.

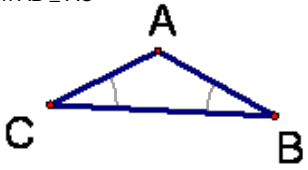
Base Angles Theorem-(Theorem 4.7) If 2 sides of a Δ are ≅, then the angles opposite those sides are ≅.

Since $\overline{AB} \cong \overline{AC}$, then ∠C ≅ ∠B


Conv. B.A.T.

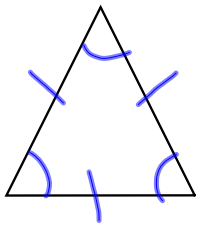
The Converse of the Base Angles Theorem-(Theorem 4.8) If 2 angles of a Δ are ≅, then the sides opposite those angles are ≅.

Since ∠C ≅ ∠B, then $\overline{AB} \cong \overline{AC}$




Corollary -If a Δ is equilateral, then it is equiangular

Corollary -If a Δ is equiangular, then it is equilateral

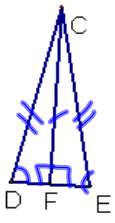


*****The altitude of an isosceles Δ is ⊥ to the base at its midpoint.

$\overline{DF} \cong \overline{FE}$

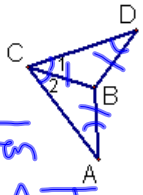
If $\overline{CF}$ is the altitude from the vertex angle, then DF = FE and m∠CFE = 90°

Why? ΔDFC ≅ ΔEFC by HL



**Proof Examples:**

Given: AB = CB = BD
$\angle 2 \cong \angle 1$
Prove: $\angle A \cong \angle D$




| S. | R. |
|---|---|
| ① AB = CB = BD | ① Given |
| ② $\angle 1 \cong \angle D$, $\angle 2 \cong \angle A$ | ② B.A.T. |
| ③ $\angle A \cong \angle D$ | ③ Subst |

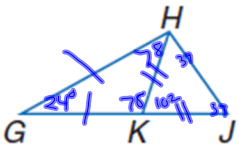
In the figure, $\overline{GK} \cong \overline{GH}$ and $\overline{HK} \cong \overline{KJ}$.

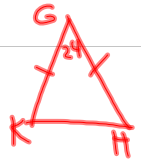
$m\angle G = 24$

$m\angle J =$ 39°

78 ÷ 2

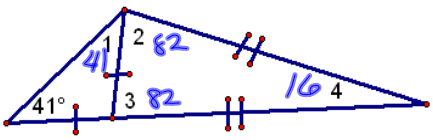
180
−24
156 ÷ 2 = 78



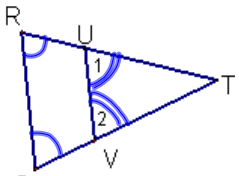




180
−78
102

Find the measures of the numbered angles.




Given: $\angle R \cong \angle S$
$\angle 2 \cong \angle 1$
Prove: $\overline{RU} \cong \overline{SV}$

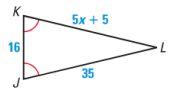


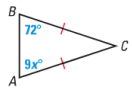

| S. | R |
|---|---|
| ① ~ | ① Given |
| ② $\overline{RT} \cong \overline{ST}$, $\overline{UT} \cong \overline{VT}$ | ② Conv. of B.A.T |
| ③ RT = ST, UT = VT | ③ def of $\cong$ |
| ④ RT = RU + UT, ST = SV + VT | ④ SAP |
| ⑤ RU + UT = SV + VT | ⑤ Subst. |
| ⑥ RU = SV | ⑥ Subtr |
| ⑦ $\overline{RU} \cong \overline{SV}$ | ⑦ def of $\cong$ |

HW
p267-268 #s 11-13, 15-17, 20-22, 32, 33

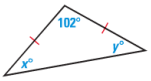
**ALGEBRA** Find the value of $x$.

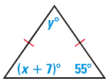
11. 


12. 


13. 

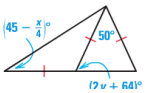

**ALGEBRA** Find the values of $x$ and $y$.

15. 


16. 

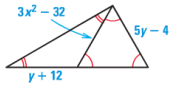

17. 


**ALGEBRA** Find the values of $x$ and $y$, if possible. *Explain* your reasoning.

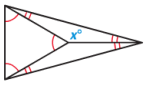
20. 

2y +64

21. 


22. 


**ALGEBRA** Find the value(s) of the variable(s). *Explain* your reasoning.

32. 


33.